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Photon Statistics of Single Carbon Nanotubes at Room Temperature XUEDAN MA, JUAN DUQUE, JARED CROCHET, BENJAMIN MANGUM, STEPHEN DOORN, HAN HTOON, Los Alamos National Laboratory — Different from zero-dimensional systems such as atoms, molecules, and quantum dots, semiconducting single-walled carbon nanotubes (SWNTs) are ideal one-dimensional systems that allow free diffusion of excitons along their length. Studies have also shown that multiple excitons exist within the diffusion length can annihilate via Auger process. Interplay of Auger process and exciton diffusion therefore could have interesting effects on photon emission statistics of SWNTs. Current existing studies [1] on photon emission statistics were conducted at low temperature where excitons were localized to quantum-dot-like states. To this end we conduct room temperature 2^{nd} order photon correlation spectroscopy studies on high quality SWNTs capable of emitting continuous photoluminescence along their length which could extend up to several micrometers. We observed the degree of photon-bunching lower than 0.5 at the lowest pumping powers. We will also present a correlation between the diffusion length and the degree of photon-bunching. Our study could have implications toward utilizing SWNTs as room temperature single photon sources.

[1] A. Hoegele, C. Galland, M. Winger, A. Imamoglu, Phys. Rev. Lett. 2008, 100, 217401.

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